THE EFFECT OF THE ADAPTIVE FREESTYLE SWIMMING LEARNING MODEL ON INCREASING SELF-CONFIDENCE IN VISUAL IMPAIRMENT STUDENTS

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Abstract

This study aims to examine the effect of the adaptive freestyle swimming learning model on increasing self-confidence in visual impairment students. The study used a quantitative approach with a quasi-experimental design in the form of a one-group pretest-posttest design. The process validation instrument included experts in disability sports, adaptive physical education, educational psychology, and educational evaluation. A total of 46 respondents participated in the instrument validity and reliability testing phase, while 8 visual impairment students participated in the treatment phase. The research instrument consisted of a self-confidence questionnaire using a 5-level Likert scale. Construct validity was tested using Pearson Product-Moment Correlation, while reliability testing using Cronbach's Alpha showed high reliability ($\alpha = 0.913$). The learning program was implemented over 18 sessions. Data analysis included descriptive statistics, the Shapiro-Wilk test and a paired-sample t-test using IBM SPSS Statistics. The results showed a significant increase in student self-confidence after the treatment ($p < 0.05$). The average N-Gain value for self-confidence (0.396) was in the moderate category. These findings indicate that the adaptive freestyle swimming learning model is quite effective in increasing the self-confidence of students with visual impairments. This study emphasizes the importance of a structured adaptive physical education program in supporting the psychological development of students with disabilities.

Keywords: *adaptive swimming, visual impairment, self-confidence, adaptive physical education, freestyle swimming*

1. INTRODUCTION

A person with a disability is any person who experiences long-term physical, intellectual, mental and/or sensory limitations who, in interacting with the environment, may experience obstacles and difficulties in participating fully and effectively with other citizens based on equal rights (Smart, 2018). Disabilities can be caused by health problems present from birth, chronic or acute illnesses, and injuries resulting from accidents, war, riots, disasters, and so on. Disability is closely related to both physical and mental health (Schalock et al., 2021; Wagenaar et al., 2022).

Education for all is one of the national development goals that is highly upheld, one of which is adaptive physical learning (Murti Wijayanti, 2022; Wijaya, 2019). Adaptive physical education and sports generally enable the realization of human life for a full life of self-realization, social activity and integration into society, with the help of rationally organized swimming activities as a livelihood, using preserved functions, remaining health, natural resources and mental strength (Isidoro-cabañas et al., 2023).

Adaptive physical education plays a crucial role in supporting the physical, psychological, and social development of students with special needs, including adolescents with visual impairments. Individuals with visual impairments generally experience limitations in movement, spatial orientation, and social interaction, resulting in lower swimming skills and self-confidence compared to adolescents without disabilities. This is exacerbated by accessibility barriers, environmental, and psychosocial factors (Alcaraz-rodr et al., 2022; Hillan et al., 2023). Therefore, a structured training program is needed that is appropriate to the characteristics of visual impairment students in order to improve their motor skills as well as their psychological aspects.

Swimming in general is an effort to float or lift the body above the surface of the water (Fathurindak, 2023; Ramli & Ahmad, 2022; Rizkiyansyah & Mulyana, 2019). Swimming is a physical activity recommended for people with visual disabilities because it has a relatively low risk of injury and can improve physical fitness, movement coordination, motor skills, and psychological well-being of students (Coyne et al., 2022; Ginis, 2025; Silva et al., 2022). In the context of adaptive physical education, adaptive freestyle swimming instruction focuses not only on mastering basic techniques but also on developing body orientation, motor coordination, balance, and self-confidence. Previous research has shown that regular physical activity can improve self-esteem, self-efficacy, and self-confidence in children and adolescents with disabilities (Mitić et al., 2020; Muñoz-hinrichsen et al., 2024; Velde et al., 2018; Zhan, 2025).

Self-confidence is a crucial psychological aspect that influences an individual's success in sports. Adolescents with visual impairments often experience psychosocial barriers such as fear, anxiety, and self-doubt due to their visual limitations. Low self-confidence can lead to reduced participation in physical activity and sports (Bertills et al., 2021; Yang et al., 2022). In Social Cognitive Theory developed by (Bandura, 1997) The experience of successfully performing swimming tasks is a major source of individual self-confidence. Therefore, improving swimming skills through systematic practice is expected to contribute to increased self-confidence in visual impairment students.

Several previous studies have discussed the relationship between swimming lessons and psychological aspects in people with disabilities. Research has shown that swimming skills have a positive relationship with the development of psychological well-being and self-perception in adolescents with disabilities (Ball et al., 2022; Di et al., 2026). In addition, visual ability and motion orientation have a close relationship with swimming performance in para-swimming athletes (Clerc et al., 2024; Fortin-Guichard et al., 2022). However, studies that specifically examine the role of improving swimming skills as a mediator of self-confidence development in adaptive freestyle swimming learning in adolescents with visual impairments are still limited, especially in the context of short-term interventions based on pilot studies.

A mediation approach is important because increased self-confidence likely does not occur directly through swimming training, but rather through the improvement in swimming skills experienced by students during the training process. As students begin to master basic swimming techniques, such as arm stroke coordination, leg movements, breath control, and body orientation in the water, they gain successful experiences that strengthen their belief in their abilities. In other words, swimming skills have the potential to be a mediating variable explaining the relationship between adaptive swimming training programs and the development of self-confidence.

Although numerous studies have discussed the benefits of physical activity and adaptive sports for people with visual impairments, most research focuses on improving physical fitness, sports participation, and general psychosocial aspects. Previous studies have also focused more on the direct relationship between physical activity and self-confidence or psychological well-being without explaining the mechanisms by which improved motor skills can influence the development of self-confidence in visual impairment students. Furthermore, studies on adaptive swimming instruction for adolescents with visual impairments are relatively limited, particularly those using short-term intervention designs based on pilot studies. Most studies related to adaptive sports have also not specifically examined the role of motor skills as a mediating variable in the development of self-confidence in visual impairment students. However, from a social cognitive theory perspective, successful experiences in mastering motor skills are a crucial factor in shaping individual self-confidence (Bandura, 1997). Thus, there are still limited studies that integrate motor skill improvement, adaptive freestyle swimming learning, and self-confidence development in one intervention model for visual impairment adolescents.

This study offers novelty through the development and testing of an adaptive freestyle swimming training model that not only focuses on improving motor performance but also examines the development of self-confidence in adolescents with visual impairments. Unlike previous research, this study analyzes the role of motor skill improvement as a mediator of self-confidence development through a bootstrapping mediation analysis approach. Furthermore, this study uses a six-week intervention-based adaptive freestyle swimming training program specifically designed to suit the characteristics of visually impaired students. This study also provides an empirical contribution to the context of adaptive physical education in Indonesia, which still has limited research related to adaptive aquatic sports for visually impaired students.

Based on the above description, this study aims to analyze the effect of a six-week adaptive freestyle swimming training program on improving swimming skills and developing self-confidence in visually impaired adolescents. Furthermore, this study also aims to examine whether improved swimming skills act as a mediator in the development of participants' self-confidence. The results are expected to provide a scientific contribution to the development of adaptive physical education and serve as a basis for developing more effective swimming training programs for visually impaired adolescents.

2. METHODS

This study used a quantitative approach with a quasi-experimental study design using a one-group pretest-posttest model. This design was used to evaluate the effectiveness of a 6-week (18 sessions) adaptive freestyle swimming training program on developing self-confidence in adolescents with visual impairments.

Participants

A total of 46 participants were involved in the instrument validity and reliability testing phase, while 8 blind students were involved in the treatment phase. The relatively small number of participants was due to the limited number of subjects who met the research inclusion criteria and the participants' ability to actively participate in the swimming training program. Despite the limited sample size, this study was designed as a pilot study aimed at obtaining initial evidence regarding the effectiveness of the adaptive freestyle swimming training model on self-confidence in blind students. Participants included students with mixed vision conditions (low vision and total blindness). All were enrolled in special education institutions and had no previous formal swimming training. The sampling technique used purposive sampling based on the following inclusion criteria: (1) Having a visual impairment in the category of low vision or total visual impairment; (2) Aged 13–15 years; (3) Having no other physical impairment that hinders swimming activities; (4) Having permission from parents/guardians to participate in the study; (5) Willing to participate in the entire training program for 6 weeks.

Intervention

The study was conducted over 6 weeks, with a training frequency of 3 times per week (a total of 18 sessions) and a duration of 90 minutes per session. Each session followed a structured progression: (1) Warm-up (10 minutes); (2) Orientation and Adaptation in the Water (10 minutes); (3) Body Confidence (10 minutes); (4) Main/Skill (20 minutes); (5) Build/Conditioning (30 minutes); (6) Cool Down (5 minutes); (6) Structured feedback and reflection (5 minutes).

The adaptive freestyle swimming training program was implemented in stages, including: (1) Water activity; (2) Body position; (3) Leg movement; (4) Arm movement; (5) Breathing; (6) Coordination; (7) Start and Finish. At each session, participants were trained by an expert adaptive swimming coach in a 1:4 ratio, meaning four participants were trained by one coach. The learning method used verbal demonstrations, physical guidance, task progress, and direct feedback from the coach. Each meeting includes an evaluation by the coach, and every four meetings, the coaching team evaluates participants' strengths and weaknesses and develops a follow-up plan. This intervention emphasizes progressive mastery, repetition, and corrective feedback, in accordance with the swimming learning principles proposed by (Schmidt & Lee, 2014).

Research Procedures

The study was conducted over 6 weeks using a one-group pretest–posttest design. Before the treatment was administered, all participants underwent a pretest, which included a freestyle swimming performance test and a self-confidence assessment. The adaptive freestyle swimming training program was implemented over 18 sessions, supervised by researchers and adaptive swimming coaches. The training program focused on body orientation in the water, breathing control, hand and leg coordination, floating techniques, and freestyle swimming movement patterns tailored to the characteristics of visually impaired students. Each training session was conducted systematically with gradually increasing levels of difficulty and using adaptive learning strategies. After the entire training program was completed, participants returned for a posttest using the same instruments and procedures as in the pretest. The data obtained were then analyzed to determine the effectiveness of the intervention on the development of participants' self-confidence.

Research Instruments

The instruments used in this study consisted of an adaptive freestyle swimming skills assessment and a self-confidence questionnaire. The swimming skills instrument was used to measure freestyle swimming performance, which included swimming speed and basic freestyle swimming techniques, and was adapted to the characteristics of visually impaired students. The self-confidence questionnaire was developed using a five-level Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Before use, the instrument first went through an expert judgment process involving experts in adaptive sports, adaptive physical education, educational psychology, and educational evaluation. Validity testing was conducted using Pearson Product-Moment Correlation on 46 respondents who had similar characteristics to the study participants. The test results showed that 36 of the 42 items were declared valid. Furthermore, reliability testing using Cronbach's Alpha showed a high internal consistency value ($\alpha = 0.913$).

Data Analysis

Data analysis was performed using descriptive and inferential statistics with the help of IBM SPSS Statistics version 27. Descriptive statistics were used to determine the average value, standard deviation, minimum score, and maximum score on the research variables. Before hypothesis testing was carried out, data normality test was performed using the Shapiro-Wilk test because the sample size was relatively small. Paired sample t-test was used to determine the difference in pretest and posttest scores on freestyle swimming performance, basic swimming skills, and self-confidence. The effectiveness of the treatment was also analyzed using the normalized gain (N-Gain) score.

3. RESULTS AND DISCUSSION

Instrument Validity and Reliability

Instrument validity and reliability testing were conducted prior to the intervention program's implementation. Content validation involved adaptive sports experts, adaptive physical education experts, educational psychologists, and educational evaluation experts. Expert judgment results indicated that the adaptive freestyle swimming training model was feasible for application to visually impaired adolescents. The self-confidence questionnaire initially consisted of 42 items, and after expert review, all items were revised and deemed suitable for construct validity testing.

Construct validity testing was conducted on 46 respondents with similar characteristics to the study participants. Analysis using Pearson Product-Moment Correlation showed that 36 items were valid, while 6 items were deemed invalid and were therefore eliminated. Furthermore, reliability testing using Cronbach's Alpha yielded a coefficient of 0.913, indicating that the instrument has very high internal consistency and is reliable for use in research.

Descriptive Statistics

Descriptive statistical analysis was conducted to determine the mean and standard deviation of freestyle swimming performance, swimming skills, and self-confidence before and after treatment. The analysis showed an improvement in all study variables after implementing the adaptive freestyle swimming training program for 6 weeks.

The average swimming speed decreased from 110.66 seconds in the pretest to 47.05 seconds in the posttest, indicating an improvement in the participants' swimming performance. The average freestyle swimming skill score increased from 59 to 82.6, while the average self-confidence score increased from 129.25 to 149.25 after treatment. Furthermore, the standard deviation values in the posttest tended to be lower, indicating that the participants' abilities became more homogeneous after participating in the training program.

Table 1. Descriptive Statistics

Variable	Test	Mean	SD	Min	Max
Swimming Speed	Pretest	110.66	13.056	88.88	126.35
	Posttest	47.05	8.225	34.01	55.80
Swimming Skills	Pretest	59.00	8.417	50.00	70.00
	Posttest	82.62	7.963	74.00	93.00
Self-confidence	Pretest	129.25	13.499	107	144
	Posttest	149.25	10.767	128	160

Normality and Effectiveness Test

Before hypothesis testing, the data were first tested for normality using the Shapiro-Wilk Test due to the relatively small sample size. Afterward, parametric statistical analysis was performed using a paired sample t-test, with the results shown in the table:

Table 2. Normality and Paired Sample t-Test Results

Variable	Shapiro-Wilk Sig.	Mean Difference	t	p	N-gain	Category	Interpretation
Swimming Speed	0.505	63.60750	25.117	0.001	0.576	Moderate	Significant Improvement
Swimming Skills	0.107	-23.62500	-37.800	0.001	0.597	Moderate	Significant Improvement
Self-confidence	0.396	-20.000	-7.234	0.001	0.396	Moderate	Significant Improvement

The results of the Shapiro-Wilk Test for normality showed that all study variables had a significance value greater than 0.05, indicating that the data were normally distributed and met the assumptions for parametric analysis. Furthermore, the Paired Sample t-Test results showed a significant difference between pretest and posttest scores for all study variables, with a p-value <0.05. These findings indicate that the adaptive freestyle swimming training program is effective in increasing the self-confidence of students with visual impairments.

For the swimming speed variable, a positive mean difference value indicates a decrease in swimming time after the treatment, indicating an improvement in the participants' swimming performance. Meanwhile, negative mean differences for the swimming skill and self-confidence variables indicate that the posttest scores were higher than the pretest, indicating an increase in the participants' abilities and confidence after participating in the training program.

Furthermore, the N-Gain analysis results showed that all variables were in the moderate category. The swimming speed variable obtained an N-Gain value of 0.576, swimming skill 0.597, and self-confidence 0.396. These results indicate that the adaptive freestyle swimming training program provides quite effective improvements in the development of self-confidence in blind students.

Effect Size Analysis

Effect size analysis using Cohen's d showed that the adaptive freestyle swimming training program had a significant impact on increasing participants' self-confidence. Cohen's d values for swimming speed were 1.52, swimming skill 13.36, and self-confidence 2.56. All of these values fall into the very large effect category, indicating that the intervention had a very strong practical impact on improving swimming ability and developing self-confidence in blind students.

Table 3. Effect Size Result

Variable	t	p	Cohen's d	Interpretation
Swimming Speed	25.117	0.001	1.52	Very Large
Swimming Skills	37.800	0.001	1.64	Very Large
Self-confidence	7.234	0.001	1.58	Very Large

Discussion

The results of the study indicate that a 6-week adaptive freestyle swimming training program is effective in improving swimming performance, swimming skills, and self-confidence of students with visual impairments. This finding is supported by the results of the paired sample t-test which showed a significant difference between pretest and posttest scores for all study variables ($p < 0.05$). In addition, the N-Gain results in the moderate category indicate that the intervention provided was able to provide a fairly effective increase in the participants' abilities. These findings indicate that adaptive swimming training can be an effective learning strategy in adaptive physical education for adolescents with visual impairments.

The improvements in swimming speed and skill performance in this study indicate that structured training can help participants develop motor coordination, body orientation, and motor control in the water.

These results align with previous research that demonstrated that adaptive aquatic training can improve motor skills and coordination in students with disabilities (Rohani et al., 2025; Veryadi et al., 2025). In addition, other research states that adaptive physical activity provides meaningful movement experiences for individuals with visual impairments, thereby increasing sports participation and motor competence (Haegele & Zhu, 2017). The findings of this study also support the theory of motor learning which states that repeated practice and consistent practical experience can significantly improve mastery of motor skills.

The study also showed an increase in self-confidence in blind students after participating in an adaptive freestyle swimming training program. This finding supports the theory (Bandura, 1997) about self-efficacy, it explains that the experience of success in performing motor tasks is one of the main sources of individual self-confidence. When participants begin to master the basic techniques of freestyle swimming and demonstrate improved performance in the water, they gain mastery experiences that impact increased self-confidence. The results of this study are in line with previous research that states that adaptive physical activity can improve psychological aspects such as self-esteem, self-efficacy, and self-confidence in students with special needs (Haegele & Zhu, 2021; Ng, 2020).

The very high Cohen's d values across all variables indicate that the intervention had a strong practical impact on improving participants' abilities. This finding suggests that despite the relatively small sample size, the training program was able to produce significant changes in performance. In adaptive exercise research, effect size is an important indicator of the strength of an intervention, especially in pilot study designs with a limited number of participants. These results support previous research suggesting that adaptation-based physical activity programs have a significant impact on the physical and psychosocial development of individuals with disabilities (Rakaa et al., 2025).

This research has several important implications for the development of adaptive physical education. The adaptive freestyle swimming training program can be used as an alternative learning model to enhance the psychological development of blind students, particularly self-confidence. Furthermore, the results of this study indicate that a movement experience-based learning approach can help blind students gain successful experiences that positively impact the development of self-confidence. Therefore, adaptive physical education teachers and disability sports coaches need to develop training programs that are safe, structured, and tailored to the characteristics of blind students.

However, this study has limitations in the relatively small number of participants, requiring careful interpretation of the results. Furthermore, the intervention duration of only six weeks may not be sufficient to assess long-term psychological development in participants, particularly self-confidence. Therefore, future research is recommended to involve a larger number of participants and utilize an experimental design with a control group to obtain stronger generalizability of the results. Practically, the implementation of this training model can also support the development of disability sports in school environments and improve the quality of adaptive physical education services for blind students.

4. CONCLUSION

A six-week adaptive freestyle swimming training program proved effective in improving the self-confidence of blind students. The analysis revealed a significant difference between pretest and posttest scores across all study variables, with a p-value <0.05. Furthermore, the N-Gain results were moderate, indicating that the training program provided a moderately effective increase in participants' self-confidence. Cohen's d analysis demonstrated a very large effect size for all study variables, indicating that the intervention was not only statistically significant but also had a strong practical impact on improving swimming ability and developing self-confidence in blind students.

Overall, this study confirms that adaptive freestyle swimming training can be an effective alternative learning model in adaptive physical education to support the psychological self-confidence development of blind adolescents. However, further research with a larger number of participants and a more robust experimental design is needed to strengthen the generalizability of these results.

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